Qualitative vs. Quantitative Assessment of DWI in MRE in Pediatric Ulcerative Colitis (PUC)

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Purpose:
To compare qualitative and quantitative measurements of DWI in the bowel wall of children diagnosed with PUC.

Methods:
Retrospective study that included newly diagnosed patients with PUC who underwent Magnetic Resonance Enterography (MRE) within 7 days of endoscopy and a group of controls with normal endoscopy findings. MRE was performed in a 1.5 T Magnet. The protocol included coronal and axial DWI, b=1000. Bowel was divided in cecum (Ce); ascending colon (AC); transverse colon (TC), descending colon (DC); sigmoid colon (SC); and rectum (Re). Endoscopy was positive if ulceration, inflammation or edema were documented. No subjects displayed terminal ileum involvement. Two readers were blinded to diagnosis. DWI was restricted (DR) if there was high signal intensity on b1000 and corresponding low signal intensity on the ADC map. ADC values were measured drawing Regions of Interest (ROI) on the GE FuncTool software. Interclass correlation (ICC) and Linear Mixed Effects Models with Random Intercept (LMEMRI) were calculated for ADC values. Inter-rater reliability (kappa), sensitivity (se) and specificity (sp) were calculated for DR.

Results:
Data from 15 patients with PUC and 15 normal controls was analyzed. Kappa values for DWI Ce 0.64, AC 0.62, TC 0.71, DC 0.81, SC 0.87 and Re 0.86. ICC for ADC were Ce 0.04, AC 0.22, TC 0.32; DC 0.07, SC 0.42 and Re 0.24. For reader 1/reader 2: Se of DWI: Ce 91/73%; AC 69/62%; TC 77/69%; DC 100/93%; SC and Re100%. Sp of DWI: Ce 94%; AC 100%; TC 94/100%; DC 87/100%; SC 93%; and Re 87%. LMEMRI for ADC values show no statistical difference between groups in any segment.

Conclusion:
Qualitative DWI measurements show better inter rater reliability, se and sp in the detection of PUC as compared to quantitative ADC values. ROIs of varying sizes and locations, depending on the radiologist, can yield significant inter-observer variance (Bilgili 2004).